A Study on Simulation Methods in Academic Success With Reference To Teaching Biology for Education Students

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Abstract

The main objective of this study is to determine the utility of simulation methods in biology teaching for nursing students and academic success. 100 students (50 control, 50 experimental) who studied at Srinivasa Teacher Training School, Kalikiri, Recognised by Sri Venkateswara University, Faculty of Education, Tirupati, AP, India, 2014 -215 academic year participated in this research. In the present study mixed methods approaches were used namely qualitative and quantitative methods. Instructional transaction included the subject of "Biology" in the "daily life and importance" unit. Statistical results (p= 0.01, p<0.001, and p<0.001) of the present study data after obtained the application revealed that the experimental students group were more successful who were taught by simulation method than the students of the control group taught by traditional approaches. Once again the results of the present study evidenced that experimental students who taught by using simulation method were satisfied with simulation-based biology education.

Keywords: Biology, Education, Students, Simulation, Technology in Biology and Education.

Introduction

In recent decades classroom education has adopted technology use and simulation methods in science education for better understanding and traditionally adapt the prevailing levels of science and technology rote learning in education and facts. This is a legacy of behaviouristic ways to teach science and instructional techno models that adapted to focus on the direction that attention on the science segments and building blocks of science discipline rather than engaging students in the actual practices with the envision of the building blocks must be mastered before proceeding to overarching processes. Understudies in classrooms customarily remember science statements and the names of chemicals and bones without utilizing that information to investigate common wonders or take part in to the next level of the procedures of science. This viewpoint of science learning has been braced and delved in by the behaviouristic presentation of the assessments all around used to review understudies' abilities and learning. These examinations have hung on because of the nonattendance of various sorts of assessment that match their budgetary and practical effortlessness of use. These standard implications of learning, educating, and evaluation, regardless, don't acclimate to the national measures for science preparing

and the broader 21st century aptitudes saw as fundamental for all subjects including sciences, the NRC report, Taking Science to School [1] coordinates current perspectives on goals for science learning.

A considerable measure of study has been done and will be done on guideline of Biology. These studies revealed that understudies have misconceptions of besides difficulties in adjusting a couple of thoughts, for instance, evolution, genetics, cell, ecology, plant development, human development and photosynthesis. [2, 3, 4]. Illuminations not the same as test conclusions are named as misinterpretations, choice appraisals, elective thoughts, wrong suppositions, pre-cognizance's, standard thought thoughts [5]. Misconceptions can be portrayed as data contrary to the test realities, which understudies have learnt before or in the midst of the guideline process. Clairvoyance of the misconceptions has a great place in learning of the knowledge wholly and permanently because of the removal of existing misconceptions and the prevention of the realization of new misconceptions [6, 7].

Mitotic and meiotic cell division have a great importance in biology education as these divisions in cells play and contribute to growth, reproduction and genetics of plant and mammalian species. In addition, to that of these are occurs at microscopic level of organs and in cells. Hence, it may be the main obstacle for the students to recreate as a concrete evidence and construct the concepts in biology subjects [8]. Studies have been reported on the students struggle with the main concepts of chromosomes, genes, mitotic and meiotic cell division concepts in biology [8, 9]. Among all concepts in biology especially cell division is to be considered quite difficult than other concepts [10]. Disabilities related to the mitotic and meiosis cell divisions are relies on primary education of biology and concepts of biology [11].

In light of the available literature, there are diverse studies have been attempted on simulation models to understand the concepts of biology. The concepts of biology subject are extremely susceptible to misunderstanding by the students during the primary and secondary education. This study was aimed to examine the aspects of biology for education students who have been familiar with the subject since secondary education and some may have differed opinions about various biology concepts.

However, no study exists on the effect of simulations on academic success of education students. In future where they are going to be used as a tools for supporting theoretical lectures. Therefore, the purpose of the present study is to evaluate the academic success rate in education students by simulation methods. In order to fulfil the purpose of the study, the authors have sought answers to the following questions: Is there a meaningful variation between pre-test success scores of the education students in the control group when compared with their corresponding experimental group?

Is there a meaningful difference between post-test success scores of the students in the control group when compared with their corresponding experimental group?

What do the students thinking in the experimental group and support of simulation in biology education?

Methodology

In the present study an experimental paradigm which consists pre-test and post-test of the control group. A mixed paradigm which consists the qualitative data were used to achieve the objective of the study. A deep

analysis is required in order to make sure to show all aspects of the present study done in scientific research. To achieve such objectives it is very important for the findings of research study that based on the paradigm of mixed research where both qualitative and quantitative research patterns are to be reliable [12].

Graduate students supported by simulations constituted the experimental group and those who are not supported by simulations constituted the experimental control group. Students of the control group lessons were taught and given by the researcher with traditional methods in teaching namely black board, where as in case of the experimental group students were received the simulation based teaching. A "Success Test" was conducted for both groups before and after experimentation based on Biology. Also, an interview was conducted based on semi structured questions at the end of the experimentation.

Study Group 100 students (50 control, and 50 experimental) who studied Teacher training course in the Department of Education, students of the first semester of the academic year 2014-2015 were selected for the study. The age of the students, who participated in the present research ranged from 17-22.

Data Collection Tools Biology Success Test (Pre-Test/Post-Test) Researchers prepared a multiple choice success test about the Biology for the daily life. To analyse the reliability and validity of the data a test was conducted to 45 students apart from the students who participated in the study and taught the Biology by traditional methods to students. The percentage of correct answers in the test and the percentage of the item known were calculated.

Semi Structured Interview Form Researchers [13] prepared a semi-structured interview form which contains 10 open-ended questions for the students in the experimental group in order to determine their ideas about simulation-supported Biology education and necessary corrections were made. Students from the experimental group were interviewed and recorded. Each interview took about 8 minutes per participant. For qualitative data, "coding based on the notions that are received from data" technique was used. In this technique, a researcher reads the data and determines the important aspects considering the aim of the research. Depending on these aspects, the researcher manifests particular codes or produces codes based on the data [14]. Data obtained from the experimental students were encoded upon the concepts of biology.

The data were collected by a pre-test about the biology from experimental and control groups before and after the study.

Data Analysis Qualitative and quantitative research methods were used together in this study. SPSS 20.0 was used to analyse the quantitative data. Independent t-test was used to analyse the quantitative data obtained from the success test.

Results and Discussion

Table 1. Pre-test scores of the control and experimental and control group graduate students of education.

Group	N	Mean SD	SE	P
Control	50	39.330± 1.545	1.529	P= 0.6
Experimental	50	39.833 ± 1.545		

The findings of the present study pre-test results shows that the mean of the pre-test score card points of the experimental graduate students of the education is 39.833   when compared to their respective control group 39.33. The results of the present study shows that there is no significant variations between the means of control and experimental group students of education. Results of the present study evidenced that the both group students has the same cognitive levels of at the time of pre-test.

Table 2. Post-test scores of the control and experimental and control group graduate students of education.

Group	N	Mean SD	SE	P
Control	50	58 ± 2.483	1.693	p < 0.001
Experimental	50	75 ± 3.574		

The post-test results of the present study shows that the average marks of the experimental graduate students of the education is 58 ± 2.483 when compared to their respective control group 75 ± 3.574. The results of the present study shows that statistically significant variations between the means of control and experimental group students of education ($p< 0.001$). The results of the present study evidenced that the experimental students has the improved cognitive skills than that of the control group students. Hence, that simulation-supported teaching methods in biology is much more effective than the traditional teaching methods.

Table 3. Pre-test scores of different sections of the control and experimental and control group graduate students of education.

Factor	Control	Experimental	SE	P
Fill in the blanks (10)	4.833 ± 1.545	4.5 ± 1.101	0.734	P= 0.83
Matching (10)	4.167 ± 1.227	4.333 ± 1.434	0.865	P= 0.80
Short answer (10)	4.167 ± 1.227	4.667 ± 1.271	0.867	p = 0.48

The findings of the present study pre-test results of different sections namely fill in the blanks, matching, and short answers shows that the mean of the pre-test score card points of the experimental graduate students of the education are 4.5 ± 1.101, 4.333 ± 1.434 and 4.667 ± 1.271 when compared to their respective control group as 4.833 ± 1.545, 4.167 ± 1.227 and 4.167 ± 1.227 respectively. . The results of the present study shows that there is no significant variations between the means of control and experimental group students of education in different sections namely fill in the blanks, matching, and short answers, that means the both control and experimental group students has the same cognitive levels of at the time of pre-test.

Table 4. Post-test scores of the control and experimental and control group graduate students of education in different sections.

Factor	Control	Experimental	SE	P
Fill in the blanks (10)	5.5 ± 1.101	7.333 ± 1.271	0.654	P= 0.01
Matching (10)	5 ± 0.939	7.833 ± 1.227	0.601	p < 0.001
Short answer (10)	5.333 ± 0.542	8.333 ± 0.857	0.394	p < 0.001

The post-test results of the present study shows that the average marks in different sections namely fill in the blanks, matching, and short answers of the experimental graduate students of the education is 7.333 ± 1.271, 7.833 ± 1.227, and 8.333 ± 0.857 respectively when compared to their respective control groups 5.5 ± 1.101, 5 ± 0.939, and 5.333 ± 0.542. The results of the present study shows that statistically significant variations between the means of control and experimental group students of education (p= 0.01, p< 0.001, and p< 0.001).

Summary and Conclusion

The results of the present study evidenced that the experimental students has the improved cognitive skills than that of the control group students in different sections of the post test. Hence, that simulation-supported teaching methods in biology is much more effective than the traditional teaching methods.

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